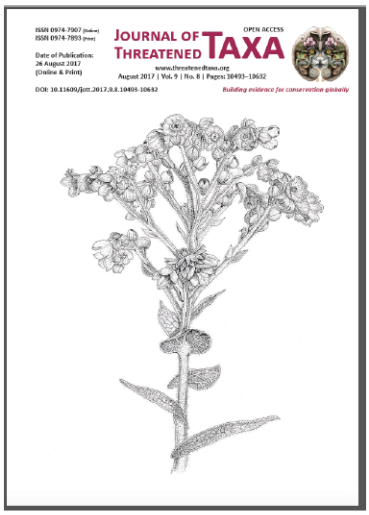

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Note

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A checklist of butterflies (Insecta: Lepidoptera) from Taleigao Plateau, Goa, India

Dipak Bowalkar [1], Nadar Anal Gracy Michael [2], Kiran Gaude [3] & I.K. Pai [4]

[1,2,3,4] Department of Zoology, Goa University, Taleigao Plateau, Goa 403206, India
[1] dipakbowalkar@gmail.com, [2] gracymichael59@gmail.com, [3] kiran.gaude@gmail.com (corresponding author), [4] ikpai@unigoa.ac.in

Plateaus are characteristic features of Goa (Alvares 2002). They are intermediate areas between the Western Ghats and the coastal plains and are known to harbor endemic plants of the Western Ghats (Joshi & Janarthanam 2004). The most prominent plateaus in Goa are Pernem, Mopa, Morgim, Assonora, Ponda, Kundaim, Betul, Sanvordem and Quepem. Plateaus are often considered as barren lands and hence they were the natural choice for setting up developmental projects (Alvares 2002; Desai & Shanbhag 2012). Taleigao plateau (Fig. 1) is not an exception to this and several state institutions, hostels and residential areas have been set up in this area. It covers an area of about 296ha with moist deciduous forest mixed with evergreen species, scrub jungle and lateritic vegetation and is surrounded by sloping valleys and alluvial plains of two rivers—Mandovi in the north and Zuari in the south (Desai & Shanbhag 2012). This plateau encompasses Goa University campus spanning an area of 173ha, residential buildings and Dr. Shyama Prasad Mukherjee Indoor Stadium. With regards to the biodiversity of Taleigao plateau, the flora (Joshi & Janarthanam 2004) and avifauna (Shanbhag & Gramopadhye 1993; Shyama & Gowthaman 1995; Desai & Shanbhag 2012) is well documented.

Gaonkar (1996) documented 251 species from the state. Subsequently, Pai & Mehndiratta (2001) have documented 52 species. Later Borkar & Komarpant (2004) reported 97 butterfly species from Bondla Wildlife Sanctuary. Recently, Gaude & Janarthanam (2015) reported 33 butterfly species from four sacred groves of Goa, viz., Nirankarachi Rai, Alvatinichi Rai, Mharinginichi Rai and Azobachi Rai. Rangnekar (2007) in his photographic guide dealt with common butterfly species of Goa, though he did not mention the total number of species. Recently Rangnekar & Dharwadkar (2009) reported three new butterfly species, Black-Vein Sergeant *Athyma ranga* Moore, White-banded Awl *Hasora taminatus* (Hubner) and Coon *Psolos fuligo* (Mabille), making a total of 254 species to the butterfly fauna of Goa. However, there is hardly any report of butterfly diversity from this regions. It was in this context that the present work was undertaken.

Field investigations at Taleigao plateau (Fig. 1) at 15.4588333 N & 073.8340556 E carried out from June 2014 to July 2015. During the study period Sunday mornings between 07:00–10:30 hr were utilized for the study purpose. The butterflies were documented by direct observation, random walks and opportunistic sightings (Murugesan et al. 2013). Visually encountered butterflies were identified on the field using photographic guides of Rangnekar (2007) and Kehimkar (2008).

A total of 98 species belonging to 72 genera were recorded (Table 1), which constitutes about 39% of the known butterfly fauna for the state. This includes 34 species of Nymphalidae, followed by Lycaenidae (25

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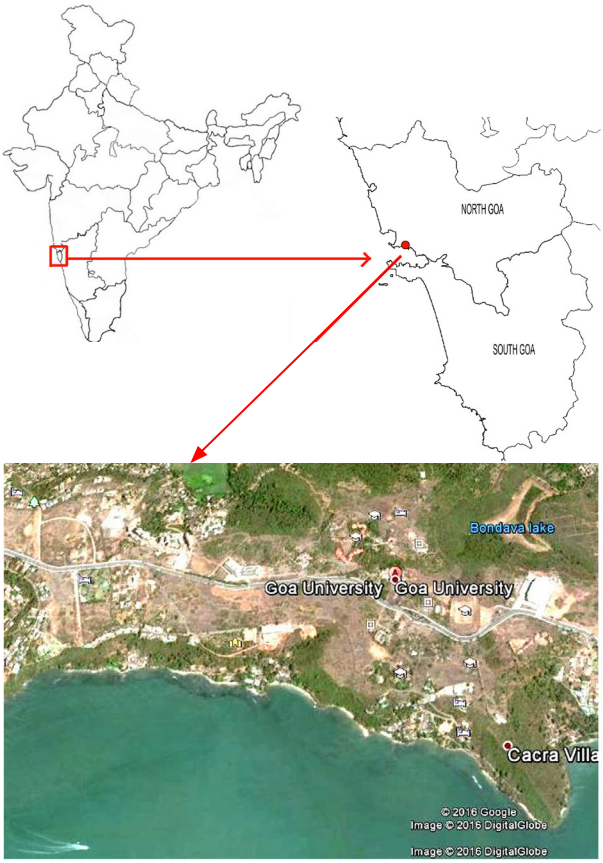

Figure 1. Study Area - Taleigao Plateau

species), Hesperiidae (16 species), Pieridae (13 species), and Papilionidae with 11 species. Of the 98 butterfly species, two species, the Malabar-banded Peacock *Papilio buddha* (Image 1e) and the Southern Birdwing *Troides minos* (Image 1h) are endemic to the Western Ghats and 10 species, viz., Southern Birdwing, Crimson Rose A*ltrophaneura hector* (Image 1d), Common Pierrot *Castalius rosimon* (Image g), Danied Eggfly *Hypolimnas misippus*, Pea Blue *Lampides boeticus*, Gram Blue *Euchrysops cnejus* (Image 1f), Common Cerulean *Jamides celeno*, Common Wanderer *Pareronia valeria* (Image 1c), Common Gull *Cepora nerissa* (Image 1b), Common Crow *Euploea core* (Image 1a) are protected under the Indian Wildlife (Protection) Act (1972). Of these, *Troides minos*, *Altrophaneura hector*, *Castalius rosimon*, *Hypolimnas misippus* have been placed as Schedule I; *Lampides boeticus*, (*Euchrysops cnejus*), *Jamides celeno*, *Pareronia valeria*, and *Cepora nerisa* in Schedule II and *Euploea core* under Schedule III species.

Family Nymphalidae was the most dominant among the families reported. Availability of larval host plants and adult nectar plants could be one of the reasons for its dominancy (Murugesan et al. 2013). Different authors in their respective studies observed a similar pattern of dominance (Kunte 1997; Kunte et al. 1999; Eswaran & Pramod 2005; Dolia et al. 2008; Krishnakumar et al. 2008; Gaude & Janarthanam 2015). Plateaus in Goa are known for their rich floral diversity (Joshi & Janarthanam 2004). In the present study, family Lycaenidae was the second largest family, with 25 butterfly species; Nimbalkar et al. (2011) got similar results. It is known that members of Lycaenidae largely feed on grasses (Nimbalkar et al. 2011) and the vegetation of Taleigao Plateau is also dominated by herbs, shrubs and rough grass species interspersed with trees. At the study site grass species persist from June to late December, hence it could be a good host for the members of the Lycaenidae family. This is followed by the family Hesperiidae with 16 species. This clearly indicates the importance of the plateaus for the members of the family Hesperiidae. This plateau is infested with invasive plant species such as *Chromolaena odorata*, i.e., known for its high nectar production (Laxmi & Raju 2011) and *Lantana camara* that flowers throughout the year and is a good source of nectar for butterflies (Day et al. 2003), which could be some of the reasons for the wide assemblage of butterfly species.

Findings of the present study underline the importance of Taleigao plateau as a preferred habitat for butterflies. The presence of endemic and schedule butterfly species, viz., *Papilio Buddha*, *Troides minos*, *Altrophaneura hector*, *Castalius rosimon*, *Hypolimnas misippus*, *Lampides boeticus*, *Euchrysops cnejus*, *Jamides celeno*, *Pareronia valeria*, *Cepora nerissa, Euploea core* also indicates the importance of this plateau for butterflies. The management of landscape, as well as of their food plants, may help to maintain and increase the butterfly diversity on the plateau. In the present scenario, plateau after plateau has been encroached upon for various mega projects, which doesn't bode well for conservation of biodiversity of these unique habitats. It is imperative to carry out systematic studies on the flora and fauna on a number of plateaus in the region, identify them as protected sites, such that, these plateaus with grassland patches can be conserved.

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Image 1 a–h. (a) Common Crow *Euploea core*; (b) Common Gull *Cepora nerisa*; (c) Common Wanderer *Pareronia valeria*; (d) Crimson Rose *Altrophaneura hector*, (e) Malabar-banded Peacock *Papilio buddha*; (f) Gram Blue *Euchrysops cnejus*; (g) Common Pierrot *Castalius rosimon*; (h) Southern Birdwing *Troides minos*

Table 1. Checklist of butterflies of Taleigao Plateau

	Common name	Scientific name
	Family: Papilionidae	
	Subfamily: Papilioninae	
1	Common Blue bottle	*Graphium sarpedon* (Linnaeus)
2	Tailed Jay	*Graphium agamemnon* (Linnaeus)
3	Common Mime	*Chilasa clytia* (Linnaeus)
4	Malabar-banded Peacock#	*Papilio buddha* Westwood
5	Common Mormon	*Papilio polytes Cramer*
6	Red Helen	*Papilio helenus* Linnaeus
7	Blue Mormon	*Papilio polymnestor* Cramer
8	Lime Butterfly	*Papilio demoleus* Linnaeus
9	Common Rose	*Atrophaneura aristolochiae* (Fabricius)
10	Crimson Rose	*Atrophaneura hector* (Linnaeus)*
11	Southern Birdwing#	*Troides minos* (Cramer)*
	Family: Pieridae	
	Subfamily: Coliadinae	
12	Small Grass Yellow	*Eurema brigitta* (Cramer)
13	Common Grass Yellow	*Eurema hecabe* (Linnaeus)
14	Spotless Grass Yellow	*Eurema ta* (Boisduval)
15	Common Emigrant	*Catopsilia pomona* (Fabricius)
16	Mottled Emigrant	*Catopsilia pyranthe* (Linnaeus)
	Subfamily: Pierinae	
17	Small Salmon Arab	*Colotis amata* (Fabricius)
18	Great Orange Tip	*Hebomoia glaucippe* (Linnaeus)
19	Dark wanderer	*Pareronia ceylanica* (C. & R. Felder)
20	Common Wonderer	Pareronia valeria (Cramer)**
21	Common Gull	*Cepora nerisa* (Fabricius)**
22	Common Jezebel	*Delias eucharis* (Drury)
23	Psyche	*Leptosia nina* (Fabricius)
	Family: Lycaenidae	
	Subfamily :Miletinae	
24	Apefly	*Spalgis epius* (Westwood)
	Subfamily : Curetinae	
25	Indian sunbeam	*Curetis thetis* (Drury)
	Subfamily: Theclinae	
26	Large Oakblue	*Arhopala amantes* (Hewitson)
27	Yamfly	*Loxura atymnus* (Stoll)
28	Monkey Puzzle	*Rathinda amor* (Fabricius)
29	Common Silverline	*Spindasis vulcanus* (Fabricius)
	Subfamily: Polyommatinae	
30	Angled pierrot	*Caleta caleta* Hewitson
31	Common pierrot	*Castalius rosimon* (Fabricius)*
32	Zebra Blue	*Leptotes plinius* Fabricius
33	Rounded Pierrot	*Tarucus nara* Kollar
34	Common Cerulean	*Jamides celeno* (Cramer)**
35	Forget me not	*Catochrysops strabo* (Fabricius)
36	Pea Blue	*Lampides boeticus* (Linnaeus)**
37	Dark Grass Blue	*Zizeeria karsandra* (Moore)
38	Pale Grass Blue	*Pseudozizeeria maha* (Kollar)
39	Lesser Grass Blue	*Zizina otis* (Fabricius)
40	Tiny grass blue	*Zizula hylax* (Fabricius)
41	Indian Cupid	*Everes lacturnus* (Godart)
42	Red pierrot	*Talicada nyseus* (Guerin-Meneville)
43	Quaker	*Neopithecops zalmora* (Butler)
44	Common Hudge Blue	*Acytolepis puspa* (Horsfield)
45	Gram Blue	*Euchrysops cnejus* (Fabricius)**
46	Plains Cupid	*Chilades pandava* (Horsfield)
47	Suffused double banded Judy	*Abisara bifasciata suffuse* (Moore)
48	Dakhan Common Acacia Blue	*Surendra quercetorum biplagiata* Butler
	Family : Nymphalidae	
	Subfamily : Danainae	
49	Blue Tiger	*Tirumala limniace* (Cramer)
50	Dark Blue Tiger	*Tirumala septentrionis* (Butler)
51	Stripped Tiger	*Danaus gnutia* (Cramer)
52	Plain Tiger	*Danaus chrysippus* (Linnaeus)
53	Glassy Tiger	*Parantica aglea* (Stoll)
54	Common Crow	*Euploea core* (Cramer)***
	Subfamily: Charaxinae	
55	Common Nawab	*Polyura athamas* (Drury)
56	Black Raja	*Charaxes solon* (Fabricius)
	Subfamily: Satyrinae	
57	Common Evening Brown	*Melanitis leda* (Linnaeus)
58	Common Treebrown	*Lethe rohria* (Fabricius)
59	Common Palmfly	*Elymnias hypermnestra* (Linnaeus)
60	Common Bushbrown	*Mycalesis perseus* (Fabricius)
61	Dark Banded Bushbrown	*Mycalesis mineus* (Linnaeus)
62	Common Four ringed	*Ypthima huebneri* Kirby
	Subfamily: Heliconinae	
63	Towny Coster	*Acraea violae* (Fabricius)
64	Rustic	*Cupha erymanthis* (Drury)
65	Common Leopard	*Phalanta phalantha* (Drury)
	SabFaamily: Limenitinae	
66	Commander	*Moduza procris* (Cramer)
67	Common Lascar	*Pantoporia hordonia* (Stoll)
68	Common Sailer	*Neptis hylas* (Linnaeus)
69	Common Baron	*Euthalia aconthea* (Cramer)
70	Grey Count	*Tanaecia lepidea* (Butler)
	Subfamily: Biblidinae	
71	Angled Castor	*Ariadne ariadne* (Linnaeus)

	Common name	Scientific name
72	Common Castor	*Ariadne merione* (Cramer)
	Subfamily: Nymphalinae	
73	Painted Lady	*Vanessa cardui* (Linnaeus)
74	Blue Pansy	*Junonia orithiya* (Linnaeus)
75	Yellow Pansy	*Junonia hierta* (Fabricius)
76	Chocolate Pansy	*Junonia iphita* (Cramer)
77	Grey Pansy	*Junonia atlites* (Linnaeus)
78	Lemon Pansy	*Junonia lemonias* (Linnaeus)
79	Peacock Pansy	*Junonia almana* (Linnaeus)
80	Great Eggfly	*Hypolimnas bolina* (Linnaeus)
81	Daniad Eggfly	*Hypolimnas misippus* (Linnaeus)*
82	Autumn Leaf	*Doleschallia bisaltide* (Cramer)
	Family: Hesperiidae	
	Subfamily :Coeliadinae	
83	Common Banded Awl	*Hasora chromus* (Cramer)
84	Brown Awl	*Badamia exclamationis* (Fabricius)
	Subfamily : Hesperiinae	
85	Common banded redeye	*Gangara lebadea* (Hewitson)
86	Chestnut Bob	*Lambrix salsala* (Moore)
87	Giant redeye	*Gangara thyrsis* (Fabricius)
88	Grass Demon	*Udaspes folus* (Cramer)
89	Pygmy Scrub hopper	Aeromachus pygmaeus (Fabricius)
90	Bush hopper	*Ampittia dioscorides* (Fabricius)
91	Tamil grass dart	*Taractrocera ceramas* (Hewitson)
92	Rice Swift	*Borbo cinnara* (Wallace)
	Subfamily : Pyrginae	
93	Golden Angle	*Caprona ransonnetti* (C. & R. Felder)
94	Fulvous piedflat	*Pseudocoladenia dan* (Fabricius)
95	Tricolour Flat	*Coladenia indrani* (Moore)
96	Common small Flat	*Tagiades japetus* (Stoll)
97	Water snow Flat	*Tagiades litigiosa* Moschler
98	Indian Skipper	*Spialia galba* Fabricius

* - Schedule I; ** - Schedule II; *** - Schedule III;
# - Endemic to the Western Ghats

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